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EDITORIAL NOTES

LINES OF DEVELOPMENT

WE indicated last week the trend of the discussion at the meeting of the Eastern District of the Southern Association held on Nov. 26, when Mr. G. L. Braidwood gave a Paper ("JOURNAL" of Dec. 2, p. 286) touching upon a wide variety of current thought within the Gas Industry. An outline of the discussion, necessarily condensed, will be found on later pages of this issue. We also published in last week's "JOURNAL" the Address delivered by the President of The Institution of Gas Engineers, Mr. E. V. Evans, to the Manchester District Association on Nov. 27—an Address to which we gave the title, we hope appropriately, "Justification for Development." We think the two contributions could to advantage be studied side by side. It seemed to us that Mr. Evans put the principles of development very clearly and, we suggest, at this time of day beyond reasonable dispute. The Industry, he said, should develop itself with the Ministry of Fuel ready and able to give sympathetic and practical assistance. Development should take place regionally and upon a co-ordinated policy. The underlying principle of development should be that our Industry shall make a greater and greater contribution to the national economy and coal conservation, and provide a greater service to the community.

Before the war, cooking comprised about 75% of gas used in the average home—a straightforward fact which emphasizes that the huge field of space heating and water heating was practically untouched by the Gas Industry. Again as a matter of fact, gas constituted only 7½% of the total heat requirements in the average household, raw coal amounting to about 70%. Considering that it was established before the war that two useful therms of coal could be replaced economically by one therm of coke and one therm of gas, there is something to think about in this diminutive figure of 7½%. Now Mr. Evans painted two vivid pictures, and we will refer briefly to them here. The first picture was this: The coal kitchener which the gas cooker has displaced had a considerable appetite for fuel. A consumption of 2½ tons of coal a year is, we think, a low estimate. The gas cooker can perform equivalent work using about 75 to 80 therms a year—in other words, the gas produced from a ton of coal. And there remains half a ton of coke. Even if we allow this half ton for the provision of warmth, we have saved a ton and a half of coal. Translate this contribution to the national economy and service to the community, taking as illustration a town of, say, 50,000 families. In such a town we have saved 75,000 tons of coal annually and saved its cartage through the streets—and incidentally we have recovered 500,000 gallons of tar and 150,000 gallons of benzole. The second picture was this: Consider what the achievement would be if a town of the size ceased to use raw coal in its homes. Assume that half the families used half gas and half coke as the source of heating, and the other half used gas exclusively. Nearly 200,000 tons less fuel would be carted through the streets; domestic chimneys would be smokeless; tar production would be increased to 3 million gallons, benzole production to 1 million gallons. Surely there is justification for our further development. On what lines should we attempt this development?

We return to the diminutive figure of 7½% and the fact that 70% of the total heat requirements of the home are met by raw coal—and, particularly, its method of replacement. In his Paper Mr. Braidwood remarked: "Until convinced to the contrary I cannot conceive coke production to be the primary function of our Industry, or even, as an ultimate object, equally desirable to the production of cheaper gas." He added, however, that this was not to argue that every effort should not be made to improve the production and sale of coke. Yet, appreciation of the fact that it is an essential factor in the economics of gas production at the present stage in its technique does not, in his view, alter the fact that "it is an anachronism for us to be selling two fuels of very different characteristics in competition with each other, and that the advantages we claim for gas are conspicuously lacking in coke." It would seem that Mr. Braidwood regards coke only with tolerance until such time as high pressure or complete gasification becomes general practice. But when is that likely to be? In a previous Address only a few months ago ("JOURNAL" of Sept. 16) Mr. Evans emphasized that the vast expansion of the Industry envisaged must not wait upon the work on high-pressure gasification. The carbonizing process as practised in the latest design of plant available to-day is one of high efficiency, and such plants are eminently capable of taking up all additional loads. And Mr. Evans was at pains to stress that a great deal has yet to be done before the work on this highly fascinating process has any practical significance in our Industry.

At the meeting of the Southern Association it was suggested that with high-pressure technique the Industry could contemplate distribution of gas at a high initial pressure, manufacture gas at a comparatively few super gas stations, and then concentrate on distribution and selling. We must, however, envisage the immediate future, appreciating that, unlike the generation of electricity, gas can be produced as efficiently in a small well-conceived works as in a large works, and that as things stand at present the gasification of coal or coke in general yields a gas more costly of manufacture and distribution than is coal gas. One of the speakers in the discussion on Mr. Braidwood's Paper pointed out pertinently that the cost at which gas can be sold is tied to the cost of coal, the value of coke, and the inefficiencies in manufacture, such as expenditure on fuel and on wear and tear of the materials of which the plant is constructed. We feel sure that by reducing these inefficiencies gas-works technicians could materially help to further gas sales. Regarding the value of coke, what really is amiss with well-screened continuous vertical retort coke, produced from coals as we knew them in the years immediately preceding the war, as a solid smokeless fuel for long period domestic room warming? We must consider the needs of the average family under the economic conditions likely to prevail after the war; and we think that coke, post-war, ought not to be an anachronism. It seems to us that we are by no means justified in expecting sufficient large-scale experience from high pressure gasmaking processes to warrant any neglect of coke for a long time to come; and we think it would be entirely mistaken policy for those who hold responsible positions in the Industry to delay decisions for replacing inefficient out-of-date plant, in the hope that a revolution in gas manufacturing methods will somehow or other solve their difficulties and bring about rapidly an all gas as distinct from a gas *cum* coke era.

SMOKE ABATEMENT

DURING the past six months the National Smoke Abatement Society has been vigorous—a fact indicated by expressions of opinion in *Smokeless Air*, the publication of which continues unabated. The current issue is No. 50. Perhaps this does not sound very impressive, but to us it seems a reflection of considerable steadfastness of purpose—a community purpose which the Gas Industry and our own "JOURNAL" have much at heart. The figure of fifty is not, of course, astronomical, but *Smokeless Air* is not a "daily" or even a "weekly." The first number of the periodical appeared in 1929, coinciding with the amalgamation of the Coal Smoke Abatement Society and the

Smoke Abatement League. Its title was *Clean Air*, as the majority of our readers will remember. The title did not last long, for the simple reason that this was the title of a bulletin issued by a non-smokers' organization which was in league against the use of tobacco. So *Clean Air*, maybe playing for safety rather than originality, decided, with appropriate dignity, to be known as the *Journal* of the Society, and continued till No. 37 made its appearance. Then, just prior to the war, at a time when the Society was so to speak feeling its feet and public conscience regarding the evils of smoke from raw coal was being aroused, came *Smokeless Air*, a greatly improved publication in many ways. There were two issues before the September of 1939, and after that it was considered with due seriousness that the periodical might be well advised to put up the shutters. Fortunately it did nothing of the sort. The Society, at a lean period, continued to be supported, and *Smokeless Air* kept on keeping on, though attenuated and, as we know, not "paying its way." So to No. 50, which seems to us a worthwhile and exceedingly useful issue, better and more virile than the official *Journals* prior to the war.

No. 50 contains a plan for the complete abolition of coal smoke from our towns and cities within ten years from the end of the war. Obviously we cannot tell even approximately the year which may witness the proposed millenium. Much depends on Hitler's plans, and no doubt a great deal on the plans of the Ministry of Fuel, which may or may not agree with the proposals which the National Smoke Abatement Society have tenaciously plugged away at for years—the creation of smokeless central and other special zones—and set out anew and unashamedly in the current issue of *Smokeless Air*. The proposals are reviewed in relation to post-war needs, and it is suggested that the means for ending the smoke problem should be an intrinsic part of the national fuel policy. The article in question, the apologetic tone of which impresses us, contends that legislative requirements, even for domestic premises, could be kept quite simple, and need not be more than extending the provisions of the present law so that the emission of smoke, without reference to colour or density, shall, in a prescribed area, constitute a statutory nuisance. An evolutionary spreading of smokelessness is advocated, radiating from the smokeless zones. All of which, we think, would be highly beneficial, but all of which depends on whether the Government, speaking with the voice of the people, thinks that smoke from raw coal is or is not bad, and decides accordingly.

"The rate of progress"—we quote from the article to which we have referred—"would depend primarily upon the rate at which increased supplies of smokeless fuels and appliances became available." We suggest that, with anti-coal smoke legislation, supplies of smokeless fuels could increase very rapidly. We also suggest that no change-over ought to be compelled until it is known with reasonable certainty that the smokeless fuels will be capable of replacing raw coal, however that raw coal may be used. In other words, that the change-over can be effected on the grounds of merit—a substantially equal or a better performance—rather than being forced at the pistol point. In which regard we really do wonder whether the Gas Industry is at all united in its policy concerning the production of first-class solid smokeless fuel. Whether, in fact, it talks a great deal on divers platforms about the evils of domestic smoke, perhaps from the outsider's view to suit its own book, the while it concentrates insufficiently on the preparation of solid smokeless substitutes for raw coal and is apt to ignore in this respect the requirements of the consuming public, to satisfy which is the Industry's *raison d'être*.

Economics of Gas Lighting

A short time ago a Police Constable of Houghton-le-Spring saw a light shining through the chink at the bottom of the front door of a dwelling, and the house seemed to have an air of unoccupancy. He recorded his impressions in authorized style, and took the opportunity later of returning to the premises, when he interviewed the good lady now present and chatted amicably about the gleam of light he had seen and recorded. The lady offered her apologies, explaining that she must have forgotten to turn off the light when, after inserting one penny—and one penny only—in the prepayment gas meter she had closed the front door and left the house for a few days. No doubt with the facts about the Battle of Fuel well in mind, the constable queried whether one pennyworth of gas would suffice for a light continuously burning for, according to his record, eleven days, or 264 hours. Did not Mr. Therm's "Guide to Fuel Saving" set out that a fuel unit (2½ therms of gas) would light an average-sized room for 100 hours only? And was gas sold in the district at less than a half-penny a therm? In vain did the housewife plead at the local Police Court that eleven days' lighting by gas had only cost her one penny. The Magistrates decided that even gas could not prove so economical. They thought that in the circumstances 10s. would be more appropriate, and they charged accordingly.

Atmospheric Pollution

For the first time comprehensive records are being kept of the consumption of coal in different districts by different industries and by private consumers. Efforts are being made to use coal as efficiently and economically as possible, and perhaps we can look forward to a decrease in soot deposit and suspended impurity. As it is, deposited matter has increased in Great Britain as a whole since the war, continuing the upward trend which was noted a year ago. This is brought out by the figures given in the Report for the year ended March 31, 1942, of the Committee on Atmospheric Pollution. The increase is due principally to industrial activity, but the Report states that there is evidence that both air raids and air defence measures are also to blame. There is also the effect of the use of inferior and unsuitable fuel owing to the exigencies of war.

Personal

Mr. B. C. MORTON, Director and General Manager of Messrs. Robert Dempster & Sons, Ltd., Elland, has been appointed Managing Director in succession to the late Mr. W. H. Handley; and Mr. E. W. KING, Sales Representative, has joined the Board.

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Mr. W. S. ATKINSON, formerly Works Manager of the Stockton Forge Works of Messrs. Head, Wrightson & Co., Ltd., and now local representative, was presented with an inscribed wallet containing Savings Certificates by the Chairman of the Company, Sir Guy Wrightson, Bt., on completion of sixty years' service with the firm.

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Mrs. M. NEWSOM, probably the oldest woman in England, who died in London on Nov. 20, at the age of 104, was an aunt of Mr. Cyril G. Davis, Deputy Chairman of Radiation Limited. She retained her faculties almost unimpaired, and knitted, without spectacles, for the troops until the end.

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Mr. L. C. B. WILLIAMS, Engineer and Manager of the Thetford Station of the British Gas Light Company, Ltd., has been elected a member of Thetford Town Council.

* * *

The new Mayor of Stepney is Mr. H. C. ROEDER, an engine fitter employed since 1924 at the Stepney Works of the Commercial Gas Company. Mr. Roeder was elected to the Stepney Borough Council in 1937.

Obituary

The death occurred on Oct. 31, at the age of 66, of Mr. J. MITCHELL, who was Engineer and General Manager of the former Southgate and District Gas Company from 1903 till 1938, when he retired on its amalgamation with the Tottenham and District Gas Company. Prior to going to Southgate deceased was assistant to the Hornsey Gas Company, which he joined in 1895.

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The many friends of Mr. J. B. BALMFORTH, Engineer and Manager of the Bingley Gas Department, will regret to learn that his eldest son, Sgt.-Observer T. W. BALMFORTH, R.A.F., has been killed in action during flying operations over enemy territory on Oct. 30. He was formerly in the Coldstream Guards and the Metropolitan Police Force.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

NATIONAL FEDERATION OF GAS COKE ASSOCIATIONS

ANNUAL REPORT

THE following is the General Committee's Second Annual Report. It covers the period ended June 30 last.

During the year the membership of the Federation has increased so that the whole of England, Scotland and Wales is now covered by District Coke Associations, all of which are members of the Federation. These members are as follows: Lancashire and District, London and Counties, Midland Counties, North of England, South Wales and District, Isle of Wight, Scottish, Yorkshire, and Cornish.

Mr. R. W. Foot, who has been Chairman of the Federation since its inception in 1939, found it necessary to tender his resignation on being appointed Joint Director-General to the British Broadcasting Corporation. The Committee accepted Mr. Foot's resignation with very much regret and extended to him the good wishes of the Federation in his important new work. Colonel H. C. Smith has been appointed Chairman to succeed Mr. Foot.

The Federation is the official national gas coke organization and is recognized as such by the Ministry of Fuel and Power. The work which has been done by the Federation has demonstrated the need for such a national organization, and it is gratifying to know that the Gas Industry has recognized this and has not only formed Coke Associations in all districts, but has made them representative to the extent of 97% of the total coke produced.

Reviewing the specific work of the year the General Committee has indicated to the Ministry of Fuel and Power (previously the Mines Department) its desire to assist in every way and, by the centralization of its contact with the Ministry, much time and effort has been saved on the part of all concerned, and some help has been given to the Industry which might not have been possible by individual application. For instance, at the invitation of the Ministry, a Coke Producers' Consultative Committee has been set up. This Committee is representative of the Gas and Hard Coke Industries, and is consulted by the Ministry before any decisions affecting coke are made. This Consultative Committee was invited to meet Sir William Beveridge on several occasions in connexion with his proposed rationing scheme. Subsequently, on that subject, it has co-operated with the Consultative Committee of the Coal Merchants' Federation of Great Britain in making representations to the Ministry on the practical working of such a scheme.

Another function of the Coke Producers' Consultative Committee has been to consult with the Ministry on the various Government Orders and Directions. The exact nature of these cannot be disclosed in this Report, but they are considered by the General Committee to have been of considerable importance to the Industry.

Other important work in which the Federation has been engaged is in connexion with the Fuel Efficiency Campaign.

In the last Report reference was made to the work of the tripartite National Policy Committee, representative of this Federation, of the British Hard Coke Association, and of the South Wales Anthracite and Dry Coal Committee. During the year the work of that Committee has continued. In November, 1941, it presented to Lord Reith, then Minister of Works, a "Memorandum on the Utilization of Solid Smokeless Fuels for Heating Services and their Place in the Planning for Post-War Reconstruction." This was a comprehensive document dealing with the various aspects of the utilization of solid smokeless fuels and was welcomed by the Ministry. As a result, representation has been invited on some Government Committees set up to investigate problems in connexion with heating and fuel matters. Mr. W. L. Boon (the Federation's Technical Adviser) represents the three industries on these Committees.

This tripartite Committee has also issued a booklet entitled "Producer Gas Plant for Industrial Purposes—Its Operation and Maintenance," which has been officially recognized as a comprehensive text-book on this subject. Already there has been a considerable demand for this publication.

Both these documents were prepared by the tripartite Technical Sub-Committee and the cost has been borne proportionately by the three industries concerned.

The desirability of obtaining the fullest possible operation between coke producers and distributors is recognized by the Federation. Coke Distributors' Branches are established in the London and Counties Coke Association and Midland Counties Coke Association areas. Other districts are engaged in work preliminary to the formation of similar branches, which it is hoped will result in co-operation of this kind being secured nationally. Throughout the country a considerable percentage of coke is handled by distributors, and it is considered important that their interest in the business should be suitably recognized and margins given relative to the work involved, so that distributors are encouraged to push the sale of coke and to take an interest in its marketing, as opposed to taking orders. The General Committee is of the opinion that this work should not be delayed in view of its post-war importance.

The technical work of the Federation is increasing. The change over from coal to solid smokeless fuels in certain industries, consequent upon the shortage of coal and the necessity for economy in all fuels, has emphasized the necessity for the proper utilization of coke, and the Technical Department has been able to assist in this. Mr. W. L. Boon is on a number of Committees which have been set up by the Minister to deal directly with fuel economy.

In spite of the many difficulties under which producers are working, due to the varying coals which they are called upon to use, it is important that the necessity for the proper grading and sizing of coke should not be lost sight of. The scarcity of coal for certain industrial purposes and the consequent conversion to coke opens up new fields, but they can be maintained only by continuity of supply of suitable types of coke, so that coke quality cannot be emphasized too strongly.

The establishment of the formula whereby it is allowed, subject to the approval of the Ministry in each case, that coke prices may be increased at the point of production by 50% above the increased pithead prices of coal (reported in the last Annual Report), has simplified the granting of coke price increases because it establishes a case for an increase in coke prices every time coal is advanced at the pithead. During the year under review the Ministry deviated from their usual practice of granting coal price increases nationally, and made these applicable to certain districts only. This was met by the District Coke Associations concerned—namely, the Lancashire and District Coke Association and the London and Counties Coke Association—forming a pool by which coke prices throughout the district were increased by a flat sum, sufficient to cover the pithead coal price, and that money returned to the Association, who pays it out proportionately to the producers affected by the coal price increase. In calculating the increase in coke prices necessary to cover these schemes the above formula was used.

In addition to the general increases the Ministry have agreed that, for the areas where co-ordination between gas and hard coke prices has been established, that is, the London and Counties Coke Association, the Midland Counties Coke Association, and the North of England Gas Coke Association, contracts held pre-war at prices below the schedule may be brought up to the appropriate schedule price for the tonnage concerned, plus authorized increases.

Concentration of Industry

As a substantial user of paint and a servant of small as well as big businesses, the Gas Industry is an interested spectator of the campaign which the small paint manufacturers are conducting against the concentration of their industry, originally timed for Dec. 31, and at the moment deferred for "not less than two months." Mr. C. R. Averill, who needs no introduction to gas engineers, is taking a leading part and, in his own words, he was "tickled to death" to see a great crowd of the threatened manufacturers, supported by raw material suppliers, at a meeting in London last Thursday, at which a fighting fund was opened, officers and council appointed, and a general plan of campaign approved. Concentration aims at adapting industry to wartime conditions by releasing man power and factory space for urgent war needs. It has been discussed in the paint industry for months, and the deferment, announced only on the eve of the meeting, followed a deputation to the Board of Trade at which Mr. Averill and his friends had the support of several M.Ps., one of whom, Major H. A. Procter, is trying to secure a House of Commons debate on the whole question of concentrations, controls, and regulations.

Concentration of the paint industry would place the manufacture of paint in the hands of a comparatively small number of "nucleus" concerns, and the point made at the meeting was that the sacrifices which this step would demand of the small manufacturer were disproportionate to those required of the industry as a whole. It is not that the individual is unwilling to make sacrifices, but he wants to be sure that the big concern is doing its bit too, and that the results, in terms of war potential, are likely to justify the means. The "small" men have won the first round in securing a two months' breathing space, and the whole scheme is in the melting-pot. The Minister has promised to put his proposals into writing so that the whole industry may study them, and a new organization has been formed on broad national lines under the name of the Manufacturers' and Traders' Association, to watch the interests of the small manufacturers. For the second round the Association has enlisted the support of many more M.Ps.

Lincoln Council has decided that for the year commenced on Jan. 1, 1942, there should be a rebate of 15% in the charges made for gas consumed by ordinary and prepayment domestic consumers.

A Meeting of the Fuel Luncheon Club will be held at the Connaught Rooms, W.C. 2, on Dec. 17, at 12.40 for 1.10 p.m., when Mr. E. V. Evans, O.B.E. (President of The Institution of Gas Engineers), will give an Address on "Coal Conservation."

THOUGHT TREND IN THE GAS INDUSTRY*

By G. L. BRAIDWOOD, Gas Light and Coke Company

(*Concluded from p. 293*)

Control of the Industry

There is a school of thought which considers that public utilities should be owned by the public. This, of course, means nationalization, although there are two very different interpretations of this word. There is the complete control and management by the Government (which would make us all civil servants). There is, on the other hand, Parliamentary control of policy, but not of management, with power to intervene to safeguard the public or the workers in that industry. The latter would presumably be far more congenial to most of us. The B.B.C., the Central Electricity Board, and the L.P.T.B. are notable examples of this compromise between individualism and public control.

The word "compulsion" is anathema to some, who regard it as a restriction of their liberty, and they will usually counter with some such phrases as "sturdy independence" and "rugged individualism." This attitude worked very well during our era of great industrialization, but it can no longer cope with the highly integrated mechanism full of economic complexities which industrial life has now become. In wartime, when it is necessary to attain maximum efficiency as speedily as possible, resources are pooled, production is regulated, and profits are controlled. If such measures are necessary in emergency why are they not normally employed? With our extreme dislike of regimentation it is noticeable that when the Government advises, urges, or pleads for certain lines of behaviour the results are usually highly unsatisfactory, the excuse for non-compliance being "others are not, why should I?" Once convinced of its justification the majority would prefer compulsion, and it is only then that efficient results are obtained. Exactly the same arguments apply to the Gas Industry, which, if it is to progress, must be run more on a co-operative basis and less as a number of individual enterprises with separate entities.

If we do not control our affairs to a far greater extent than is the case at present we shall have it done for us. There have been instances, and probably still are, where little love is lost between small companies and large, between London and the Provinces, and between company and municipal controlled undertakings. There is also evidently considerable depth of feeling—much of it amazingly contradictory—as to the merits or otherwise of municipal control. Of 706 Statutory undertakings 300 are municipal controlled and make half as much gas as the other 406. All this antagonism must go, and undertakings wrapped up in their own world or imbued with intense local patriotism or parochialism must reorientate their views for the good of the Industry.

Reorganization of the Industry must be on the basis of regional supply and control. There are at present too many small concerns which harm the reputation of the Industry by their inability to provide gas of reasonably constant quality, gravity, and pressure, and whose service is almost non-existent; nor will they be able on their own to withstand future competition. We all know of many works supplying in close proximity at different price and quality, with their districts interlocking confusedly. Centralization could in such cases effect considerable economies and provide better service, but it will depend among other things on density of population, their main type of occupation and distance from the source of coal supply. Where desirable for coal to be treated and gas distributed from near the pit head, the underground gasification of coal seems to hold great possibilities. I feel that there is probably much to be learnt (and of particular application to our own high-pressure gasification experiments) from this revolutionary process with its use of liquid oxygen, development of the gas turbine, and evolution of synthetic liquid fuel and chemical products.

A strong argument in favour of regionalization is that personnel in that area would establish close interchange of problems and views, and their representatives would in turn reflect a coherent picture of the opinions of the Industry as a whole for the benefit of Headquarters. Since the engineer and manager of a company cannot be expected to be a legal, financial, and accountancy, as well as a technical, expert, regional grouping should also benefit general administration, since companies who cannot afford their own could share the services of one each of the various experts. At present this applies only to the minority of small concerns either in holding companies or amalgamated.

The number of concerns manufacturing and supplying is excessive and a large proportion of them are inefficient. (Out of 897 undertakings in England and Wales, 736, or 82%, supply only 13% of the total gas made.) After careful consideration of the views of all concerned with the management of the Industry, compulsion must be exercised according to majority decisions; after which every interest must be subordinated to the common cause.

* From a Paper to the Southern Association of Gas Engineers and Managers Eastern District), Nov. 26.

Discussion

The **Chairman** (Mr. G. Le B. Diamond, Rochester) remarking that the Author had thrown into relief many practices in the Industry for which change was indicated, thought that control of the Industry was perhaps the keynote of the Paper. For what and for whom was the Industry to be reorganized? The order might well be established as (*a*) the community, (*b*) the consumer, (*c*) the shareholders, (*d*) the directors—and the whole question was clouded over by municipal bickering and parochial outlook. For example, in the South East of England a Committee had actually been set up by the County Councils to look after the interests of these Councils, when the objects of the Councils were well enough defined as being to look after the interests of the community. By such a move the *raison d'être* of the Councils was obviously in question. How could they look for unanimity amid such confusion?

Mr. **J. W. Townsend** (Sheerness) said it seemed to him that the Industry should have a body which could not only speak, but act, authoritatively on the question of salaries and eliminate obviously "rigged" appointments, advertisements asking applicants to name their price, advertisements stating absurdly low remuneration. A scale of salaries might, of course, be useful, but it had pitfalls. In the electricity industry there was a municipal scale based on units sold, and not unnaturally engineers put forward attractive tariffs for electricity which could hardly be justified economically. Regarding gas tariffs, could not the Gas Industry yet decide what was the most suitable tariff. Surely there was experience to work upon. The denial of the right to make economic tariffs compulsory was unfortunate, but he could not believe that Parliament would grant the right, so the Industry should concentrate on good service rather than cheap gas. Then he came to the question of control of the Industry. If all gas undertakings were company owned, perhaps in time they could be welded into a homogeneous pattern without legislative interference, but the existence of municipally owned undertakings was an obstacle to voluntary change. Municipally owned gas undertakings, with notable exceptions, were too parochial; they had no desire to work in harmony with other undertakings. Local grids could easily have been established in the past—but no, the parochial spirit triumphed. His feeling was that they would have to ask for legislation to establish regionalization for the Gas Industry on the lines of the London Passenger Transport Board. The great advantage of an organization like the L.P.T.B. was that it was not run by councillors but by experts. The order of a service of the type was (*a*) the user, (*b*) the employee, (*c*) the shareholder. That order of precedence was right. Regional control, regional organization, was wanted—regional control of gas, of electricity, of water. The plight of anyone going to live in a new district to-day was neither more nor less than appalling. He did not know who, and under what terms, was intending to supply him with these essential services—whether the water would be hard or soft, whether gas would have a calorific value of 500 or 250 B.Th.U., whether electricity would be D.C. or A.C. If he moved, the appliances he had acquired might prove useless. In the area of the two gas companies which he served there were two electricity companies, two water companies, four local authorities who were water suppliers, and there was a municipally owned gas undertaking having part of its area intermingled in the area of the two gas companies he had mentioned. Chaotic?

Mr. **J. H. Dyde** (Uxbridge), commenting on the future control of the Industry, suggested that while Parliamentary and Government control of policy might be acceptable, they did not want control of management. Unified control, he considered—technical, financial, and administrative control—would strengthen the power of the Industry and should result in an up-grading of individual undertakings in any given area. As large processors of coal they had as an Industry to strive for maximum efficiency, and the Ministry of Fuel and Power had the authority to put its finger on the weak spots and to take action. Turning to planning, how was area control to be brought about? If it was to be encompassed by private enterprise, new legislation would appear desirable and necessary, for they surely did not want to witness development through financiers *qua* financiers. Concerning the absorption and purchase of individual gas undertakings, perhaps procedure had been patchy in the past. Equitable compensation to officers was obviously right; on the other hand, exorbitant compensation was not worthy of toleration.

Mr. **Muir Wilson** (South Metropolitan) argued thus as a newcomer (14 years' standing) in the Gas Industry. On joining the Gas Industry he left competitive conditions and was at once impressed by the "extreme" lack of urgency in the Industry to be "up and doing." He was amazed at the huge steady income which could have been available for modernizing plant and equipment. He wondered why so many companies preferred to spend their money in repairing and maintaining obsolete plant which could have been much more cheaply replaced by plant far less costly to run. It was, he continued, no uncommon sight to see as many men on a 100-ton a day plant as

he had been used to on a 1,000-ton a day unit which had half the fuel consumption and a better therm yield. And he wondered how companies who increased their debt on businesses which had ceased to expand or had even shown signs of contracting justified their procedure. It seemed to him too much like borrowing money to pay a dividend. Again, among the younger members of the staffs he found apprehension for the future. They had visions of having to meet keen competition with obsolete plant, and a very reduced income out of which to rebuild.

Among the older members there was often the attitude, "it'll last our time, so why worry?"—or, worse still, "Let us do some research, a slow job, thank heaven, but at least we can put off making a decision for many a long day." Thus the best weapon of progress was turned against the progressives. To those who were unprepared for the situation the war came as a godsend, envisaged by the young men; the difficulties were becoming apparent. The future? Like most postponed days of reckoning, unless the Government was generous in paying for war damage, the Gas Industry's situation would be critical when the conflict ended.

He turned to competition—unfair competition. Of course, all competition was unfair when they were getting the worst of it. Why not stop complaining and hit back a bit? Anyhow, by appealing for public pity they were, as an Industry, much more likely to arouse contempt instead of sympathy.

And then he turned to education, a subject rampant with muddled thinking. Someone had once remarked that his education started when he was born, continued to his then age of 70, only being interrupted by his four years at a famous public school. That as an aside. But so long as the object of schooling was to cram facts, which could better be looked up in books, into children's heads, instead of giving them real learning and teaching them how to think, then he was not in favour of extending the school-leaving age. There should be more opportunity for boys to become good craftsmen. What about higher education? Many gas undertakings, while offering their staffs little inducement to stay, made it almost a penal offence to think of leaving. Was it unlikely that good men would desire to enter the Industry from outside?

Mr. Wilson continued: "We have developed a type which is begotten, born, brought up and trained almost on the doorstep, and which is too often impervious to the adoption of ideas which are current in the world at large. My suggestion is that a higher proportion of our staffs be recruited from the universities, that members of the staffs are encouraged to take temporary jobs in other industries, are given leave to travel abroad for the purpose of studying social conditions and visiting plants, and that from time to time experienced executives are encouraged to come into the Industry from outside. This last suggestion may not be popular, but if it isn't popular it can only be because a sense of inferiority makes people feel that the arrangement will cut only one way. No effort to liven up our staffs can be of the slightest avail until we give our young men responsible positions. Effort should be made to have about 20% of our works engineers and other responsible officers below the age of thirty. A man, like any other animal, is at his best when young. It is a mistake to suppose that long experience is anything but an aid to imagination."

Advertizing and salesmanship were touched upon by the speaker. He presumed that money had to be spent on advertizing. In the prosperity era in U.S.A., red-hot, hell-raising salesmen galloped over the country like the hordes of Attila. Perhaps, however, the boom in trade came first, and the salesmen galloped in its wake. Was it impossible for a commodity like gas to sell itself on intrinsic merit?

Mr. **E. G. Stewart** (Gas Light and Coke) suggested that the small gas undertaking was at the core of much of the weakness of the Gas Industry, though he realized that it was wrong to charge the small undertaking with inefficiency simply because it was small. The fact remained, however, that the small undertakings had to think in terms of pence, as it were, and they were to a large extent isolated from sources of education and so on. Why, it might be asked, was it possible for the small undertaking to exist in the structure of the Industry? The point was that at present it was possible for them to supply gas and coke almost as cheaply as could the larger undertaking, and it was fundamentally a question of the transport costs of solid fuel. Looking to the future, modern high-pressure research on gas production might ultimately lead to a standard gas. With such a technique they could contemplate distribution at an initial high pressure, manufacture of gas at a comparatively few super gas stations, and their main business would be distribution and selling.

Dr. **S. Pexton** (Gas Light and Coke) suggested that in regard to education the study of Sir Richard Livingstone on "The Purpose of Education" (*The Listener*, Nov. 26) was apposite. Sir Richard indicated, in the following order of importance, that education should (1) equip a person to earn his living to the best of his capacity; (2) inculcate into the individual a civic or social sense; and (3) teach those psychological and physiological factors upon which our well-being depends. An index of whether our education had achieved its purpose was our standard of excellence in all things. As far as he (the speaker) had been able to observe, the present-day recruits from our educational institutions were mentally better equipped than their fathers. The Gas Industry had recognized its responsibility for continuing the education of its personnel, but one aspect was not sufficiently appreciated—and that was continuity. An individual was in the hands of the professional educationist up to the age of, say, 16 to 21. He then entered the Gas Industry at an impressionable age, and much of his future usefulness depended on his early treatment by them and on the contacts made in his early years in the Industry. He should be made responsible to someone a few years senior, who in turn should be under the guidance of more experienced persons. In other words, there were several stages of man's development even after leaving school or the university. In this sense an industrial research laboratory or a works laboratory had an important educational function to perform in training personnel. This applied particularly to process work, into which chemists, through their training, had a special insight.

Mr. Braidwood, like many others, was looking for a much cheaper method of gas manufacture to create an expansion in the use of gas. Gas as sold at the "commodity price" under a two-part tariff system was very largely tied to the cost of coal, the value of coke, and the inefficiencies in manufacture, such as the expenditure of fuel plus wear and tear on refractories and iron and steel of which the plant is built. It was by a reduction of these inefficiencies that gas-works technicians could materially help to further gas sales. It was, however, imperative that the great intrinsic value of coke should be recognized. He considered that well-screened coke from continuous vertical retorts was an almost ideal smokeless fuel for long period domestic room heating or water heating, particularly so for the average family under the economic conditions likely to prevail after the war.

The gasification of coal or coke under present conditions, except where one was favoured with certain special coals, yielded gas which was more costly of manufacture and distribution than was coal gas. This was one of the ultimate reasons for the great interest in Dr. Dent's able researches which were being carried out at Leeds for The Institution of Gas Engineers. But in this connexion he would sound a note of warning. They were not justified in expecting sufficient large scale experience from such processes for at least another ten years. It was therefore the duty of those in the Industry not to delay decisions for replacing inefficient out-of-date plant in the hope that a revolution in gas manufacturing methods would solve their difficulties. Research directed and carried on in such an atmosphere of commercial expectancy might easily be ruined.

The Industry would be well advised temporarily to forget that Dr. Dent was patiently working on new processes, and to apply its own improvements to existing methods so as to ensure that there was a healthy Gas Industry to which to apply the results of Dr. Dent's findings ten or twenty years hence.

There was a faint hint in Mr. Braidwood's Paper that "large works" were necessarily more efficient than "small works." It depended when the large works were conceived. Quite unlike the generation of electricity, gas could be produced as efficiently in a small, well-conceived works, particularly if such a works was directed by a keenly interested personnel.

Dr. **A. E. Haffner** remarked that from the ranks of the Industry must emerge the inspired few who would lead the Industry into its post-war re-orientation. Such men, he suggested, should be released now from other obligations so that they could design the new framework. The carbonizing industry, with its higher and still higher thermal efficiency, could, post-war, play an important part towards national recovery. Perhaps there was something to be learned even from their enemies. Before the war in Germany fuel economy was pushed to pedantic limits; lignite resources were being further exploited and low-temperature carbonization and power production were yoked together; and bold schemes for oil synthesis were launched. The structure of the German coal industry was simpler than in this country. It was controlled by only 15 concerns, and the close harmony between coal, steel, and coke made possible the development of gas grids and the organization of associated chemical industries. With the rapid spread of gas grids the Gas Industry itself underwent simplification, and numbers of small uneconomic municipal rate-relieving gas-works were shut down. High pressure gasification and transmission had already been introduced.

Britain, continued Dr. Haffner, must find its own solution. It had its own social structure and its coal industry had its own advantages. Its Gas Industry was the pioneer of the world, and its technique of gas handling had been passed on to chemical industry. Most industries in their development had seen the invention of devices which, though excellent in themselves, had caused delay in adopting even better devices. The Gas Industry had had similar successes, but some of them had blinded vision and held up wiser developments. Waste heat recovery and improvements in coke and its marketing were two successes which should be scrutinized from this viewpoint.

The Gas Industry was not an attractive industry to the student, and the chemist who left his university to enter chemical industry with its sensational development in high-pressure technique, catalytic processes, and production of plastics, looked forward to a far more interesting career than his fellow student who drifted into the Gas Industry, which was popularly supposed to have a doubtful future. The educational standards set by The Institution of Gas Engineers were not yet high enough for the real needs of the profession and its outside status. Neither were the salaries. Security there might be in the profession—but security bribes led to a concentration of mediocrity. They should increase the status of the Industry's technical officers, and they should include among them foremen, some of whom were gifted with great innate ability. Their reliability and command of their job was so great that they were capable of undertaking more responsi-

bility. Weight should be given to length and loyalty of service, but should not be the over-riding consideration. Promotion to a higher grade would have its benefit not only in the individual himself, but in those under him, who found little stimulus in the present methods and limits of promotion.

The policy of permitting research workers an undisturbed atmosphere for their work had been productive in the Industry's own researches and those of gas undertakings. But research had been left almost exclusively to the chemist. Where the problem had had engineering aspects the more versatile chemists had been able to modify their outlook. Apart from this "chemical overflow," however, engineering research had been neglected. Who in the Industry was working, for example, on the gas turbine?

Regarding advertising, it was a pity that the Industry should nurture the parasitic growths of advertisement and salesmanship. It was all the more to be condemned because it had not always been honest, and because design of appliances had been influenced by need to introduce features which magnified sales possibilities without corresponding service to the consumer.

Finally, he marvelled that the Gas Industry at a time of paper shortage had not been compelled to be served by one periodical only —a periodical which ought to be established permanently as a worthy organ of a great Industry.

Mr. **Braidwood,** prior to replying briefly to the discussion, read a communication from Mr. **C. H. Chester** (Swindon), in the course of which the writer stated that he could not see much reduction in cost per therm of gas production. The average price received by the Industry was six or eight times the average cost of production. He realized that distribution costs, including management, were covered by this six times or so the original cost of production, but they did not follow the graph of increased make compared with increased sales. This pointed to the need for bolder sales policy and tariffs, offering at something like 4d. a therm. To wait for steady increases to attain an average increased load was courting a lingering death. They must have confidence that they could supply gas at a low figure—and then almost give appliances. Eventually they would kill their own coke market, the rural districts being the last to go; but since coke could be readily gasified if they adjusted their thermal value, why worry? They were in the gas business; they got more per therm for gas than for coke. They should not overlook that any planning of high pressure to supply satellite towns or villages often provided methods of feeding back through governors to the extremities of the low-pressure distribution system, and thus hastened the provision of steady and equal pressures—a vital factor in post-war planning.

In his reply Mr. Braidwood made it clear that he had no intention of implying in his Paper that all small works were inefficient or that all small works should go—but there were too many of them. There must be further integration within the Industry. He thought that in the future a measure of Government control of the Industry was inevitable and that they must have a national gas authority. He visualized fewer and larger works, for gas was most susceptible to regional control.

AMERICAN GAS STATISTICS

[Contributed]

WITH the Reports presented at the October Convention of the American Gas Association were the Annual Statistics of the Manufactured Gas Industry and the Natural Gas Industry, respectively, in 1941. The two are separately presented. Both are admirably presented in the form of tables and graphs, which show Uncle Sam getting down to the war effort. The rise in domestic consumption from 1940 to 1941 is slowing down, and that in industrial consumption is leaping up.

The Natural Gas Industry sold 1,606,000 million cu.ft. to a population of 35.85 millions, against 406,000 millions of manufactured gas sold to a population of 48.9 millions, but the sales per head of population is best compared on the 1940 figures, the last of the pre-war years. Natural gas sold 41,150 cu.ft. per head of population against 8,050 manufactured gas which, by the way, is practically the British figure. This great difference is no doubt due (though not entirely, as the domestic consumption shows) to the vastly greater consumption of natural gas in industrial processes.

Examining the Reports in more detail we are struck by the very convenient form in which the data are analyzed and presented. When data such as these are required in connexion with the British Gas Industry, they are very difficult to find and have to be got together from many different sources.

Manufactured gas is analyzed under four headings, domestic, house heating, industrial and commercial, and miscellaneous. The tables go back to 1929.

Domestic customers steadily increased in number from 9.162 millions in 1929 to 9.617 in 1941, but house-heating customers increased from 42,000 to 365,000. From 1938 to 1941 this figure rose by 60%. Industrial and commercial customers increased at a lower rate and with more fluctuation, rising from 422,000 to 450,000 in 1931, then dipping until 453,000 was again reached in 1936, with a peak of 455,000 in 1937, and 450,000 in 1941.

Domestic sales were at their maximum in 1930 with 255 millions, sinking to 192.3 in 1939, but remaining pretty steady at approximately 200 millions from 1933 to the end of the period. House heating rose rapidly to 1940, but there was no increase to 1941—no doubt the effect of the war effort. From 1929 to 1940 this figure multiplied five times. Industrial and commercial gas jumped from 120,000 millions in 1940 to 137,000 in 1941, another indication of the war effort. Total sales were pretty constant from 361,000 millions in 1929 to 360,000 in 1939, rising to 389,600 in 1940, and to nearly 406,000 millions in 1941.

Sales per domestic customer show the same tendency as in Great Britain. It dropped from 27.7 thousand cu.ft. (excluding house heating) to 21 in 1937, since when it has remained practically constant. Sales per industrial customer fell to a minimum in 1932–33, after which they regained the 1929 figure of 219,000 in 1936 and rose steadily to 1940, making a jump to 1941. Total sales fell steadily to 1939, rising above the 1929 figure in 1940 and 1941.

The make-up of manufactured gas is admirably shown in a table and by graphs from 1929. In 1941, 272,000 million cu.ft. were produced and 165,000 millions purchased. In the former category, 180,900 millions was water gas, 57,000 millions coke-oven gas, 16,000 millions retort gas, and 6,680 millions oil gas. Of the gas purchased, 95,000 millions was coke-oven gas, and 66,000 millions natural gas. The graphs show that water-gas and coke-oven gas produced remained steady for the period from 1929 to 1941, and that retort coal gas was falling. Coke-oven gas purchased remained steady in quantity, but natural gas rose rapidly from very little in 1929 to 26,000 millions in 1932, after which the increase has been continuous to date.

In the Natural Gas Report the figures for house heating are not isolated. The sale of natural gas per domestic customer was 56,000 cu.ft., but this includes house heating. Sales per industrial customer are evidently considerably inflated by sales for electric generation which do not appear in the Manufactured Gas Report. The graphss how that all classes of sales have steadily increased from a minimum reached about 1932–33 to a figure 45% above that for 1929, which is to be compared with a corresponding increase of 8% for manufactured gas.

The best news in the Reports of the several Committees is that the excellent manual *Fuel-Flue Gases* is to be revised within the next few years. This book first appeared in February, 1940, and within less than 18 months the original issue was sold out. The revision is entrusted to a Sub-Committee under the Chairmanship of Louis Shnidman, of the Rochester Gas and Electric Corporation.

In the same Report the revision of the *Gas Chemists' Handbook* is announced. This also is in the hands of a strong Sub-Committee under the Chairmanship of E. L. Sweeney, of the Boston Consolidated Gas Company. We gather that it is proposed to issue sections of the book as they are completed in the form of small volumes or individual pamphlets, of which at least five are expected to appear this year. The subject of gas analysis is to be treated in a separate volume to be prepared by Professor J. J. Morgan. Work on it is in progress but, naturally, there will be delay in the present difficult circumstances. The Synopsis of contents given in the Report indicates that the new *Gas Chemists' Handbook* will be a great and comprehensive work. At any rate these books should be of considerable assistance to our own technicians when they come to the composition of the British Gas Industries Handbook which we all hope for after the war.

Other items in the Report of the Chemical Committee deal with improved methods and new tests all of interest to the Gas Industry, materials used in the construction of meters, and a proposed *Journal of the Gas Industry*. "The Chemical Committee voted unanimously to recognize the urgent need for a technical publication to serve the purposes of the technical section." We gather that the proposal is similar to what has been suggested in Great Britain—viz., that technical papers should be published in full in such a journal, "dividing them as may be convenient among twelve monthly issues of the journal," so that they can be discussed amply in writing instead of the usual hurried presentation and discussion at a crowded meeting.

The Builders' Section of the Gas Production Committee reported on "Twin Generator Process for making a high B.Th.U. Reformed Oil Gas," and upon other water-gas plants and coke ovens. J. S. Haug reported on the Survey of the Gas, Coke and By-Product making properties of American coals. As in the previous Conference the main preoccupation of the Committee was in increasing plant capacity to meet wartime needs. E. W. P. Smith contributed an interesting Paper on Arc Welding in Gas Plant Maintenance. A Sub-Committee has been appointed to deal with the subject of organic sulphur, and the report of the Gas Conditioning Committee includes a comprehensive paper by Drs. Kemper and Guernsey on organic sulphur in water gas and coke-oven gas. Other reports considered, which deal with a miscellany of subjects, were those of the Distribution Committee, a Sub-Committee on meters and metering, and on the operation of public utility motor vehicles.

TIN CONSERVATION*

THE Consolidated Edison Company of New York has carried out a development and test programme to find a low tin content solder formula for gas meters which will—

(*a*) Meet the requirements of the War Production Board as to tin content.

(*b*) Permit the reassembly of meters without undue mechanical difficulties.

(*c*) Result in the net saving of tin per meter reassembled.

(*d*) Result in a meter assembly capable of giving safe operation.

Experience with two solder formulae, (*a*) 30% tin, 68.1% lead, 1.8% antimony, 0.1% arsenic, and (*b*) 30% tin, 2% antimony, 68% lead, leads us to believe that these requirements have been met reasonably well. It is, of course, impossible to predict accurately its long-range performance in the field, nor can we await the results of extensive field operation before we start conserving tin. Accelerated life tests under vibration, heating, and cooling cycles above normal pressures, &c., were applied on meters assembled with these proposed low tin content solders as well as the conventional 50% tin 50% lead solder, to provide a comparison with a known standard. Such detailed comparisons were the basis for predicting the probable long-range adequacy of the proposed formula.

The solder recommended (30% tin, 2% antimony, 68% lead) is the best we have found to date. It is hoped that other investigators of the problem will check our findings as well as try other formulae. It should be remembered, however, that when a new solder is issued to the meter shop, the results at first will be disappointing until the long-established practices adapted to the use of the 50% tin-50% lead solder are adjusted to yield the optimum results with the specific formula being adopted.

A large number of solder formulae were investigated in order to select the most satisfactory one. This work consisted of assembling meters, using the various formulae, and observing the results obtained. The various solder formulae were submitted by manufacturers as being worth investigating, and when any one formula appeared at all promising the manufacturers were asked to submit additional samples, slightly varying some of the critical elements in order to obtain more satisfactory results. Twenty-six solders were investigated. The investigations were limited to small samples, and while they enabled us to select the low tin content formulae which ultimately proved the most satisfactory with normal meter shop tools, we are not prepared to say that some of the other formulae if further explored might not yield satisfactory results.

Results were obtained of bond strength tests on various solder formulae used with different fluxes. The grease flux now in use gave as favourable results with the 30% tin, 2% antimony, 68% lead solder as any of the other fluxes under test.

Vibration tests were carried out on meters assembled with solders of the following compositions:

	No. of Meters.	No. of Hours on Test.	No. of Leaks.
50% Tin 50% Lead	2	1900	None.
30% Tin 68.1% Lead 1.8% Antimony 0.1% Arsenic	2	1900	,,
30% Tin 68% Lead 2% Antimony	2 6	1700 1450	,, ,,

The beam on which the meters are mounted is vibrated by means of two solenoids at a frequency of 50 cycles per second with an amplitude of 0.005 in. The meters are tested under pressure daily to locate leaks, and while this test has not revealed any leaks to date, the two meters assembled with 50% tin and 50% lead solder, and one meter assembled with 30% tin, 1.8% antimony, 68.1% lead, 0.1% arsenic solder show signs of cracking. The water entering these slight cracks during the daily water immersion test under pressure to locate leaks has started a small amount of corrosion at these cracks. The results obtained on this as well as other tests on the two formulae of solder—namely, (*a*) 30% tin, 1.8% antimony, 68.1% lead, 0.1% arsenic, and (*b*) 30% tin, 68% lead, 2% antimony—are so similar that as far as we can tell the two formulae should give about the same long-range performance.

The heating and cooling test consisted of setting the pressure at 0.4 lb. per sq. in. at room temperature and heating the meters to 80°C. for approximately one hour with a resulting increase in pressure. The meters were then tested for leaks by immersion in water with the meter pressure set at 0.9 lb. per sq. in. The pressure was then increased to 2.3 lb. per sq. in. and the meters were placed in a refrigerator at −5° to −10°C. for approximately 1½ hours. When the meters attained this temperature they were retested at 0.9 lb. per sq. in. for leaks and then prepared for another heating cycle. The meters were subjected to these heating and cooling cycles until a leak developed. The recommended formulae of low tin content solders—namely, 30% tin, 68.1% lead, 1.8% antimony, 0.1% arsenic, and 30% tin, 2% antimony, 68% lead—give better results on this test than those obtained with the conventional 50% tin 50% lead solders. These tests indicate that long-range performance in the field will be satisfactory with these low tin content solders, and may be better than obtained with the 50% tin 50% lead solders.

The 38% tin 62% lead solder is shown by this test to be somewhat inferior to the 50% tin 50% lead solder. It is felt that unless field experience can be found to prove the acceptability of this solder, its performance on this test might justifiably raise a question as to its long-range performance in the field.

Approximately 60,000 meters have been assembled, using the two formulae (*a*) 30% tin, 68.1% lead, 1.8% antimony, 0.1% arsenic, (*b*) 30% tin, 68% lead, 2% antimony. The test results on these solders are very similar, and our choice in favour of the latter has been made on the basis that it is easier to mix and control locally when converting 50% tin 50% lead solder.

When the new formulae were first used in the shop, production work dropped by about 25%, but as the men continued to use these solders they improved their production so that now it is less than 5% lower than their former production with 50% tin 50% lead solder.

The amount of solder now used is approximately 8% higher than that used with the 50% tin 50% lead formula. Therefore, the net saving in tin per meter reassembled is 35%. In the case of the Consolidated Edison Company meter shops the saving in tin will amount to approximately 20,000 lb. per year.

A question pertinent to the use of the proposed low tin formulae is the conversion of 50% tin 50% lead solder from stock or salvaged from meters. Formula (*b*), 30% tin, 68% lead, 2% antimony, can readily be mixed by purchasing a toner metal containing 5% antimony and 95% lead. The composition of the toner metal can be varied to fit the percentage of lead and tin in the solder to be toned. The toning operation requires a melting-pot in which temperatures can be reasonably well controlled and the mixer readily agitated. The toner metal and solder to be mixed must be weighed accurately. Unless these facilities are available it is recommended that the toning be done by solder manufacturers who have the personnel and equipment to give good results. No important difference has been found between the use of cast or extruded bars.

Items Relating to Repairs of Gas Meters Using 30% Tin Content Solder

1. *Fluxes.*

(*a*) For parts that are tinned the following composition flux used liberally has been found to give good results:

Material.	Amount.
Dry rosin	5 lb.
Red oil (oleic acid)	5 gallons.
Diaphragm oil (neutral oil), Corning Oil Co.	½ pint.
Socony No. 2300 wax	½ lb.

Melt rosin and mix with hot red oil.

Dissolve wax in hot neutral oil and mix with red oil and rosin.

(*b*) The following acid flux is used for corners and untinned parts:

Material.	Amount.
Zinc chloride	16 lb.
Water	1 gallon.

Dissolve zinc chloride in water.

2. *Solder.*

The solder compositions on which this procedure is based are:

	Material.	Per cent.
(*a*)	Tin	30.0
	Arsenic	0.1
	Antimony	1.8
	Lead	68.1
(*b*)	Tin	30.0
	Antimony	2.0
	Lead	68.0

3. *Form of Solder.*

¼ in. by ¼ in. bar solder either extruded or cast.

4. *Surfaces.*

Prior to tinning, meters and parts are thoroughly washed in the usual manner.

All surfaces to be soldered are then thoroughly tinned with the solder existing on the meter being repaired. For the tinning operation, the oil flux (*a*) specified above is used.

5. *Irons.*

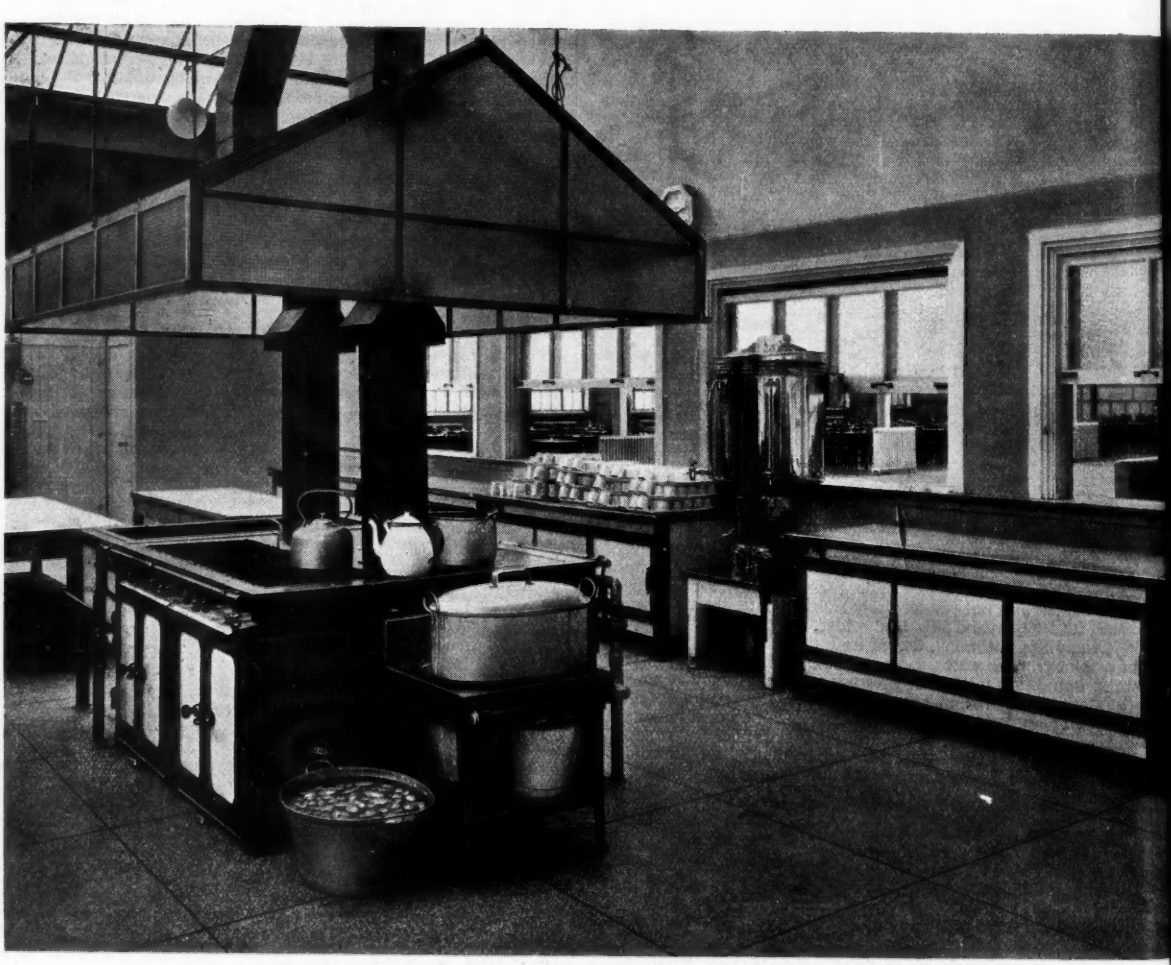
Two 2½ lb. irons are used alternately. The irons may be tinned with either 50% or 30% tin content solder. If the latter is used the irons will require more frequent tinning.

6. *Seams.*

First sweat the seams and on the second application apply a bead as usual. In soldering the seams care should be taken to prevent the heat from spreading far into adjacent metal surfaces in order to prevent cracking as the solder solidifies. Practice in this detail is required in order to enable the meter repairer to perform consistent work.

* From an article in the A.G.A. *Monthly* by C. P. Xenis and A. F. Kochendorfer.

Add our Service to Your Salesmanship



This Industrial Canteen Kitchen, fitted with Radiation Cooking Equipment, caters for 750 workers a day.

Gas Products Prices

The London Market Dec. 7.

The only item of interest in connexion with the London Coal Tar Products market is that fair quantities of Pitch are being sold on the basis of 45s. per ton naked at Makers' Works. Otherwise no change.

The Provinces Dec. 7.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 90's, 1s. 10d., pure, 2s. 5d. (controlled by the Control of Toluene No. 2 Order, July 3, 1941, which fixes the maximum price at which this material may be sold). Coal tar, crude naphtha, in bulk, North, 1s. to 1s. 4d. according to quality. Solvent naphtha, naked, North, 2s. 2d. to 2s. 6d. Heavy naphtha, North, 1s. 10d. to 1s. 11d. Carbolic acid, 60's, controlled by the Coal Tar Acids Prices (Inland) Order, 1942, operative from May 1. Naphthalene, controlled by the Naphthalene prices (Inland) Order, 1942, dated April 15, 1942, and operative from May 1, 1942, £19 to £19 10s.—bags free. Anthracene, controlled by the Anthracene Prices (Inland) Order, 1942, operative from May 1. Filtered heavy oil (min. gr. 1,080), 7½d. to 8d. Creosote oil has been generally controlled as to direction and price for some time past. Current value—fuel grades 5d. to 5½d; timber preservation and other purposes 4½d. to 6d. These prices apply as from May 13.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Tar Products in Scotland Dec. 5.

Several new "orders" are impending. Refined tar controlled. Value is 4½d. per gallon *ex* Works, naked. Creosote oil: Specification oil, 6½d. to 7d.; low gravity, 7½d. to 7½d.; neutral oil, 6½d. to 7d. per gallon; all *ex* Works in bulk. Refined cresylic acid is available in small quantities at 3s. 6d. to 4s. 6d. per gallon *ex* Works, naked, according to quality. Crude naphtha: 6½d. to 7d. Solvent naphtha: 90/160 grade, 2s. 5d. to 2s. 6d., and 90/190 Heavy naphtha, 1s. 11d. to 2s. per gallon. Pyridine: 90/160 grade, 13s., and 90/140 grade, 15s. per gallon.

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GAS APPARATUS, BURNERS, MANTLES, LIGHTING ACCESSORIES, BRASSFOUNDRY, POKER BURNERS, TOOLS, ETC.
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SCREWING TOOLS;
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GAS STOCKS AND SHARES

Markets on the whole last week were dull and uninteresting while awaiting further war developments. The publication of the Beveridge report had an adverse effect on insurance shares.

The volume of business in the Gas Market, however, was about on the same scale as the previous week, and although the former large number of upward movements eased up it will be seen that several closed another few points higher. A feature during the past month has been the sharp gain by Commercial ordinary and the stock was changing hands last week at 58. The only drop was the small reaction of 3d. in Gas Light units.

The following quotations were changed during the week:

SUPPLEMENTARY LIST

Reading 4 p.c. Deb.	95—100	+3

OFFICIAL LIST

Commercial Ord.	53—58	+1	
Ditto 3 p.c. Deb.	60—65	+2	
Gas Light Units	17/—18/-	—3d.	
Ditto 3½ p.c. max.	61—64	+2	Nov. 30
Ditto 3 p.c. Deb. (x.d.)	77—82		Nov. 30
Ditto 5 p.c. Red. Deb. (x.d.)	105—108		"
Ditto 4½ p.c. Red. Deb. (x.d.)	103—107		"
Imperial Continental Ord.	80—85	+1	
Montevideo	90—95	+3	
Tottenham Ord.	92—97	+2	
Ditto 4 p.c. Deb.	98—101	+5	

PROVINCIAL EXCHANGE

Newcastle 3½ p.c. Deb.	94½—95½	+½

Quotations on the London and Provincial Stock Exchanges

OFFICIAL LIST

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Nov. 26.
1,767,439	Sept. 7	5	5	Alliance & Dublin Ord. ...	105—110
374,000	June 29	4	4	Do. 4 p.c. Deb.	100—105
583,407	Nov. 9	5	5	Asscd. Gas & Water U'd'ts Ord.	17/6—18/6
388,938	"	—	—	Do. Deferred	17/6—18/6
500,000	"	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	17/—18/-
535,545	"	4	4	Do. 4 p.c. Red. Cum Pref.	17/—18/-
341,966	"	4	4	Do. 4 p.c. Irred. Cum. Pref.	14/3—15/3
561,370	Aug. 24	7	7	Barnet Ord. 7 p.c.	133—138
300,000	Oct. 5	1/9⅜	1/4⅜	Bombay, Ltd.	19/9—20/9
690,407	Aug. 17	7	7	Bournemouth 7 p.c.max. ...	137—142
362,025	June 15	4	4	Do. 4 p.c. Deb. ...	98—103
659,955	Sept. 7	2½	2½	Brighton, &c., 5 p.c. Con. ...	72—77
855,000	" 28	6	6	Brit. Gas Light Ord.	77—82
545,000	June 29	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	105—115
120,000	June 15	4	4	Do. 4 p.c. Red. Deb.	80—85
10,000	Nov. 6 '33	6	4	Cape Town, Ltd., 4½ p.c. Cu. Pf.	1¼—2¼
626,860	July 13	6	6	Cardiff Con. Ord.	101—106
24,500	Oct. 26	7	7	Colombo 7 p.c. Pref.	20/—22/-
764,169	Sept. 28	-/9.56	-/9.56	Colonial Gas Assn. Ltd. Ord. ...	¼—½*
400,000	"	1/3.298	1/3.298	Do 8 p.c. Pref. ...	⅝—¾*
1,748,935	July 22 '40	2	3	Commercial Ord.	52—57
620,000	June 8	3	3	Do. 3 p.c. Deb.	58—63
286,344	Aug. 17	5	5	Do. 5 p.c. Deb.	95—100
807,560	" 24	6	6	Croydon sliding scale	110—115
644,590	"	5	5	Do. max. div.	86—91
620,385	June 29	5	5	Do. 5 p.c. Perp. Deb. ...	120—125
179,500	Aug. 17	5	5	East Surrey 'B,' 5 p.c.	80—85
176,461	June 29	5	5	Do. 5 p.c. Deb. (Irred.)...	107—112
250,000	Nov. 9	6	4	Gas Consolidation Ord. 'B' ...	15/—17/-
250,000	"	4	4	Do. 4 p.c. Red. Cum. Pref.	14/6—16/6
19,107,811	July 29 '40	3⅜	4½	Gas Light & Coke Ord. ...	17/3—18/3a
2,600,000	"	3½	3½	Do. 3½ p.c. max.	58—63
4,477,106	"	4	4	Do. 4 p.c. Con. Pref. ...	78—83
2,993,000	July 8 '40	3½	3½	Do. 3½ p.c. Red. Pref. ...	77—82
6,602,497	June 1	3	3	Do. 3 p.c. Con. Deb. ...	77—82
3,642,770	"	5	5	Do. 5 p.c. Red. Deb. ...	105—108
3,500,000	"	4½	4½	Do. 4½ p.c. Red. Deb. ...	103—107
700,000	Sept. 14	3½	3½	Do. 3½ Red. Deb. ...	92—95
5,600,000	May 13 '40	4	8	Imperial Continental Cap. ...	79—84
43,820	July 27	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95
231,978	Aug. 24	5	5	M.S. Utility 'C' Cons.	77—82
918,657	"	4	4	4 p.c. Cons. Pref.	79—84
675,000	Nov. 16	†4	†4	Montevideo, Ltd.	87—92
300,000	April 27	9	7	Oriental, Ltd.	86—91
368,537	June 15	3½	2½†	Plymouth & Stonehouse 5 p.c.	65—70
621,667	Aug. 17	7½	7½	Portsmouth & Gosport Cons.	100—105
2,381,363	May 18	—	4†	Primitiva Holdings, Ltd. Ord.	11/—13/-
233,900	June 15	3½	3½	Do. 6½ p.c. Red. Cum. Pref.	96—101
648,999	Sept. 7	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	18/—20/-
597,972	"	4½	4½	Do. 4½ p.c. Cum. Pref. ...	16/6—18/6
2,528,714	Aug. 24	1/-	7½	South East'n Gas Cn. Ld. Ord.	16/3—17/3
1,000,000	"	-/10⅜	-/10⅜	Do. 4½ p.c. Red. Cum. Pref.	16/—18/-
1,068,869	"	4	4	Do 4 p.c. Irred. Cum. Pref.	13/6—15/6
6,709,895	Aug. 5 '40	4	4	South Met. Ord.	73—78
1,135,812	"	6	6	Do. 6 p.c. Irred. Pref. ...	88—93
850,000	"	4	4	Do. 4 p.c. Irred. Pref. ...	73—78
1,895,445	June 29	3	3	Do. 3 p.c. Perp. Deb. ...	76—81
1,000,000	July 13	5	5	Do. 5 p.c. Red. Deb. ...	100—105
1,543,795	Aug. 4	4	4	South Suburban Ord. 5 p.c ...	83—88
$12,825	"	5	5	Do. 5 p.c. Perp. Pref. ...	97—102
$00,000	"	4	4	Do. 4 p.c. Perp. Pref. ...	80—85
250,000	"	3½	3½	Do. 3½ p.c. Red. Pref. ...	90—95
888,587	June 15	3	5	Do. 5 p.c. Perp. Deb. ...	115—120
750,541	Aug. 17	2	6	Southampton Ord.	72—77
350,000	"	5½	5½	Swansea 5½ p.c. Red. Pref. ...	95—100
1,076,495	"	5	5	Tottenham & District Ord. ...	90—95
338,555	"	5	5	Do. 5 p.c. Pref.	95—100
453,380	June 8	4	4	Do. 4 p.c. Perp. Deb. ...	92—97
1,247,505	Nov. 9	6	4	U. Kingdom Gas Cor. Ord. ...	17/6—19/6
1,085,952	Nov. 16	4½	4½	Do. 4½ p.c. 1st Cum. Pref. ...	18/—20/-
772,709	"	4	4	Do. 4 p.c. 1st Red. Cum.Pref.	16-/—18/-
745,263	June 22	4½	4½	Do. 4½ p.c. 2nd Non.Cum. Pf.	14/—16/-
1,200,000	Sept. 14	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95
380,606	Aug. 24	6½	6½	Uxbridge, &c., 5 p.c.	102—107
1,371,138	" 10	4	4	Wandsworth Consolidated ...	84—89
2,525,768	"	4	4	Do. 4 p.c. Pref.	82—87
1,343,964	June 15	5	5	Do. 5 p.c. Deb.	120—125
383,745	"	4	4	Do. 4 p.c. Deb.	95—100
568,342	Aug. 10	5	5	Watford & St. Albans Ord. ...	98—103
300,000	June 8	3½	3½	Do. 3½ p.c. Red. Deb. ...	84—89

SUPPLEMENTARY LIST

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Nov. 26.
351,685	June 15	5	5	Brighton, &c., 5 p.c. Perp. Deb.	110—115
415,250	"	4	4	Bristol Gas Co., 4 p.c. New Deb.	98—102
140,205	Aug. 4	7	7	Cambridge, &c., 7 p.c. Cons. 'B'	130—140
295,932	Aug. 17	5	5	Cheltenham, 5 p.c. Cons.Ord....	95—100
42,500	June 15	4	4	Do. 4 p.c. Perp. Deb....	95—100
150,000	Aug. 24	4	4	Croydon Gas, 4 p.c. Pref. (Irr.)	78—83
130,000	June 29	4	4	Do. 4 p.c. Deb. ...	97—102
146,700	Aug. 17	5½	5½	East Surrey, 5½ p.c. Pref. 'A' ...	95—100
53,220	"	6	6	Do. 6 p.c. Cum. Pref. ...	115—120
...	Aug. 19 '40	6	4	Eastbourne, 'B' 3½ p.c.... ...	42—47
239,135	Nov. 9	5	5	Gas Consolidation 'A' Ord. (£1)	15-/—17/-
156,600	Aug. 17	5	5	Hampton C't, 5 p.c. Cons. Ord.	95—100
18,000	Dec. 29'41	3½	3½	Malta & Med'n., 7 p.c. 1st Pref.	30—40
10,845	June 30'41	3½	3½	Do. 7½ p.c. 2nd Pref.	30—40
50,000	Aug. 24	£5 4 6	£5 4 6	Mid. South. Utll., 'A' Cons. 5 p.c.	70—80
65,000	"	5	5	North Middlesex, 5 p.c. Pref....	90—95
70,000	Sept. 14	5	5	Plymouth & Stone., 5 p.c. Deb.	107—112
76,501	June 29	4	4	Reading, 4 p.c. Perp. Deb. ...	92—97
74,777	Sept. 30	4	4	Romford, 4 p.c. Debs. (Reg.) ...	90—95*
21,000	June 15	5	5	Slough, 5 p.c. Perp. Deb. ...	110—115
211,740	"	5	5	Southampton, 5 p.c. Red. Deb.	95—100
363,575	July 1	5	5	Tottenham, 5 p.c. Reg. Red. Mt.	99—102
202,019	Aug. 24	7⅛	7⅛	Tunbridge Wells, 4 p.c. Scale ...	119—124
135,257	June 15	5	5	Uxbridge &c., 5 p.c. Perp. Deb.	115—120

PROVINCIAL EXCHANGES

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Nov. 20.
804,948	Sept. 28	5	5	Bath Cons.	97—100
122,577	Aug. 17	6	5	Blyth 5 p.c. Ord.	100—105
1,667,250	July 13	5	5	Bristol, 5 p.c. max.	106—108
120,420	June 15	4	4	Do. 1st 4 p.c. Deb.	101—103
415,250	"	4	4	Do. 2nd 4 p.c. Deb. ...	99—101
328,790	"	5	5	Do. 5 p.c. Deb.	113—118
157,150	Aug. 4	6½	5	Chester 5 p.c. Ord.	96—99
92,500	June 15	4	4	Do. 4 p.c. Pref.	79—81
36,430	"	3½	3½	Do. 3½ p.c. Deb.	78—82
41,890	"	4	4	Do. 4 p.c. Red. Deb. ...	98—100
542,270	Aug. 17	9	6	Derby Cons.	115—120
55,000	June 15	4	4	Do. 4 p.c. Deb.	95—100
10,000	Aug. 10	10	10	Great Grimsby 'A' Ord. ...	155—165
6,500	"	10	10	Do. 'B' Ord. ...	155—165
79,000	"	10	10	Do. 'C' Ord. ...	145—155
732,000	Aug. 31	4	4	Hartlepool G. & W. Cn. & New	71—73
2,167,410	" 10	6	5	Liverpool 5 p.c. Ord.	98¾—100
245,500	June 15	5	5	Do. 5 p.c. Red. Pref. ...	100—102
306,083	July 15	4	4	Do. 4 p.c. Deb.	98—100
20,000	June 22	5	5	Long Eaton 5 p.c. Pref.	9—11
80,000	"	5	5	Do. 5 p.c. Deb.	95—100
2,430,267	Aug. 4	5½	5	Newcastle and Gateshead Con.	19/6—20/-
682,856	"	4	4	Do. 4 p.c. Pref.	94½—95½
776,706	June 29	3½	3½	Do. 3½ p.c. Deb.	93½—94½
277,285	May 4	5	5	Do. 5 p.c. Deb. '43 ...	99—101
274,000	March 17	5	5	Newport (Mon.) Ord.	86—89
13,200	Sept. 16	8⅜	7	Pontyp'l Gas & W. 10 p.c. 'A'	11½—12½
13,600	"	6	5	Do. 7 p.c. 'B'	9½—10½
40,000	"	5	6	Do. 7 p.c. 'C'	9½—10½
106,280	Aug. 10	10	10	Preston 'A' 10 p.c.	150—160
188,219	"	7	7	Do. 'B' 7 p.c.	109—119
1,806,339	Aug. 24	6½	6½	Sheffield Cons.	129—132
95,000	July 6	4	4	Do. 4 p.c. Deb.	98—100
332,351	Sept. 21	6	6	Sunderland 6 p.c. max. ...	111½—112½
192,150	Aug. 10	5	5	Weston-super-Mare Cons. ...	95—100
64,338	June 29	4	4	Do. 4 p.c. Deb.	84—89
33,340	"	7½	7½	Do. 7½ p.c. Deb.	142—147

a—The quotation is per £1 of Stock. * Ex. div. † Paid free of income-tax. †For year.

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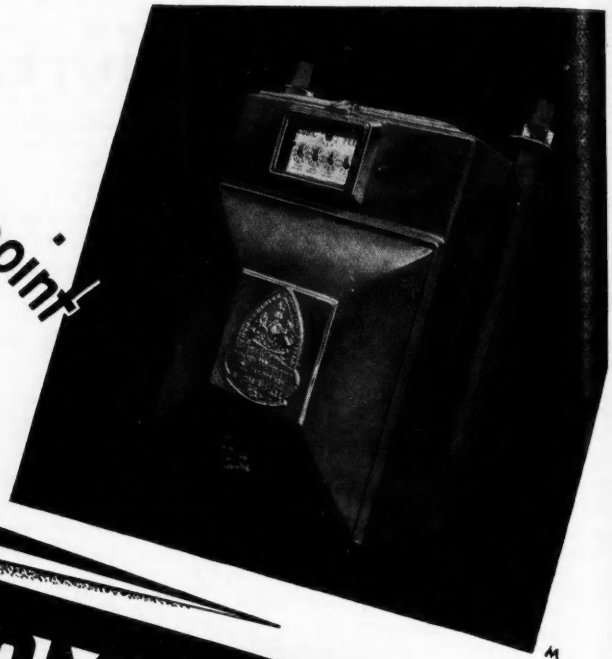

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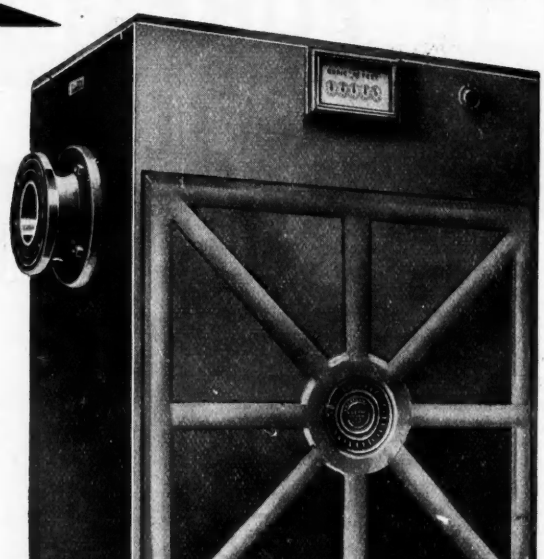

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